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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/645,387	08/21/2003	Wei William Lee	TI-26800.1	8080
23494	7590	11/26/2004	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265			NOVACEK, CHRISTY L	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 11/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/645,387

Applicant(s)

LEE ET AL.

Examiner

Christy L. Novacek

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 2 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 2 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This office action is in response to the preliminary amendment filed August 21, 2003.

Specification

The disclosure is objected to because of the following informalities: In the first paragraph on page 1 of the specification, the missing application serial numbers need to be inserted. Also in the first paragraph of page 1, a reference to the application's parent case 09/292266 must be inserted.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sahin et al. (US 6,624,064) in view of Raoux et al. (US 6,136,388).

Regarding claim 1, Sahin discloses using a plasma-enhanced CVD process to polymerize precursors on a surface (412) with gaps to form an amorphous fluorocarbon polymer layer (420) filling the gaps without voids (Fig. 6A-6C; col. 9, ln. 62 – col. 12, ln. 43). The gaps may have an aspect ratio of 3:1 (col. 9, ln. 66). Sahin does not disclose using a pulsed plasma to activate the precursors of the polymer. Like Sahin, Raoux discloses a process of using a plasma-enhanced CVD process to deposit an amorphous fluorocarbon dielectric film between metal line gaps on a

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substrate surface. Raoux teaches that it is advantageous to use a pulsed plasma to activate the precursors of the film because a pulsed plasma allows a manufacturer to tailor plasma chemistry versus plasma density to improve the film's characteristics (col. 24, ln. 46-64). Raoux teaches that this pulsed plasma method is "particularly useful when depositing amorphous fluorocarbon and other low k dielectric films" (col. 24, ln. 61-63). At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the pulsed plasma method taught by Raoux to deposit the fluorocarbon film of Sahin because Raoux teaches that a pulsed plasma improves the film's characteristics.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sahin et al. (US 6,624,064) in view of Raoux et al. (US 6,136,388) and Bandyopadhyay et al. (US 5,814,555).

Regarding claim 2, Sahin discloses using a plasma-enhanced CVD process to polymerize precursors on a surface (412) with gaps to form an amorphous fluorocarbon polymer layer (420) (Fig. 6A-6C; col. 9, ln. 62 – col. 12, ln. 43). The gaps may have an aspect ratio of 3:1 (col. 9, ln. 66). Sahin does not disclose using a pulsed plasma to activate the precursors of the polymer. Like Sahin, Raoux discloses a process of using a plasma-enhanced CVD process to deposit an amorphous fluorocarbon dielectric film between metal line gaps on a substrate surface. Raoux teaches that it is advantageous to use a pulsed plasma to activate the precursors of the film because a pulsed plasma allows a manufacturer to tailor plasma chemistry versus plasma density to improve the film's characteristics (col. 24, ln. 46-64). Raoux teaches that this pulsed plasma method is "particularly useful when depositing amorphous fluorocarbon and other low k dielectric films" (col. 24, ln. 61-63). At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the pulsed plasma method taught by Raoux to deposit the

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fluorocarbon film of Sahin because Raoux teaches that a pulsed plasma improves the film's characteristics.

Sahin does not disclose forming the polymer layer filling the gaps except for voids about the centers of the gaps. Like Sahin, Bandyopadhyay discloses a process of depositing an interlevel dielectric layer over and around metal lines. Bandyopadhyay teaches that it is advantageous to form voids in the dielectric layer about the centers of the gaps between the lines because, "the permittivity of air is less than the permittivity of a semiconductor dielectric, formation of an air gap within the dielectric causes a decrease in overall permittivity between interconnects" and "the air gap thereby reduces propagation delay and proves beneficial in meeting speed requirements within critical path interconnect lines" (col. 3, ln. 21-30). At the time of the invention, it would have been obvious to one of ordinary skill in the art to form voids about the centers of the gaps of Sahin because Bandyopadhyay teaches that the formation of the voids can reduce propagation delay and provide beneficial speed improvements by decreasing the overall permittivity between interconnects.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christy L. Novacek whose telephone number is (571) 272-1839. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:30 - 5:00.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CLN

November 22, 2004


AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800